

**COLORADO SCHOOL OF MINES**  
**Vice-President for Academic Affairs and Dean of Faculty**

**M E M O R A N D U M**

**To:** Colorado School of Mines Faculty

**From:** Nigel Middleton

**Date:** 8 September 2003

**Subject:** Strategic Planning and Research

The initial presentations, at the 2003 Annual Faculty Conference, of proposed strategic directions for the Colorado School of Mines have elicited a number of written concerns on the future directions of this institution, and particularly in the arena of research. As a companion to the recent commentary from President Trefny on this matter, this memorandum has been prepared to offer some expansions, observations and perspectives aimed at supplementing and informing this important discussion.

The Colorado School of Mines will not marginalize its research activity. The first strategic issue in the presentation, and the President's remarks, made it clear that research is fully embedded in the planned framework of this institution and its mission, for the obvious intellectual and educational reasons that typify a research university, many of which are correctly identified and repeated in the written concerns.

What is not addressed in these concerns is what it takes for this institution to support research properly, together with the real frustrations that research investigators confront when trying to carry out their research within our existing staffing, equipment and budgetary infrastructure. Department Heads and Division Directors will verify that they receive inadequate institutional funding for staff and technical support within their units. The AVP for Research and Dean of Graduate Studies will verify that funding is inadequate to meet the instructional TA needs and demand for institutionally-supported graduate assistantships within our current graduate student body, that we are frequently non-competitive on matching-fund and cost-sharing provisions in grant applications, that our graduate student recruiting potential is fund-limited, and that there is negligible capacity to go after and organize mega-scale sponsored research activities. Principal investigators will verify that they are frustrated with having to pay overhead on graduate student tuition, and that they consequently are less competitive in proposals and in offers to graduate students compared to other universities. I am limited in my capacity to provide market-competitive start-up funds to new faculty when negotiating new hires. I

need support for technology transfer, we are limited in legal capacity to design and execute new kinds of contracts that are pertinent to commercialization and the increasing opportunities for research activity with the commercial sector, and I am limited in my ability to adequately support the advancement of critical services like the library and information technology infrastructure. And I am limited in my capacity to provide across-the-board salary raises and market-competitive salaries, while also being forced to keep up with the chronic escalation of benefit premiums. The School's general fund currently recovers about \$5M in indirect costs from sponsored research, all of which must currently be absorbed in the mainstream budget of the institution in order to achieve balance. All of these perplexing circumstances prevail within our existing research activity, which comprises an award volume of about \$30M per year, an on-campus expenditure volume of about \$25M per year, headcount enrollments of about 280 doctoral students and 520 masters students (or accounting properly for part-time status, full-time equivalent enrollments of about 180 doctoral students and 310 masters students.)

If we are going to continue to be successful in research, even at our current level, we must confront the frustrations I list above. These are dollar issues, and as you know, we face many comparable dollar-capacity issues elsewhere in the institution that are less directly connected to research per se.

As our research activity has grown in the past decade from about \$15M to over \$30M, we have seen many wonderful, desirable and commendable consequences in equipment acquisition, in attraction of faculty, in the enriched intellectual environment, in recognition and reputation, in establishment of centers, and so on, but disproportional development in the support areas I discuss in my third paragraph. This evidence suggests that growth in research volume alone cannot support these needs, and so our strategic belief is that we must find a different way to do this.

Hence the size strategy proposals in the strategic planning work. The School needs to earn more revenue dollars than it does at the present, but arguably spend those incremental dollars differently from how it does at the present. We need some efficiencies of scale, and we need to make expenditures that alleviate the kind of capacity limitations I have described. Just imagine how research could flourish if this was the case. And thus, contrary to the written concerns, I argue that the strategic direction of resolving capacity limitations is a necessary prerequisite to fostering the growth of research activity and the eminence we seek in our areas of technical expertise. If we can do \$30M in our current strapped situation, what could this amount be if it was to grow unfettered by our existing limitations?

To get enough revenue dollars to address these capacity needs, and to get the kind of revenue dollars that are non-contracted and unrestricted in how we expend them within our general fund, we must consider the alternative major sources of general fund revenue. Bear in mind that it is our general fund that must receive these revenue dollars, for it is from this unrestricted fund that we must pay for most of our needs.

For a frame of fiscal reference in this discussion, consider the following data, and begin by contrasting the impact of a research dollar and a tuition dollar in the general fund. One dollar of contract-sponsored research expenditure generates (in fiscal year 2003 institution-wide aggregates) close to 20c of general fund through indirect cost return, plus 7c which is paid from grants into the general fund in tuition for graduate students, plus academic year faculty charge-out from regular salary that redirects about 2c of the dollar to research accounts, yielding a net general fund revenue impact of 29c in the research dollar. In contrast, one tuition dollar (and similarly one state-appropriated dollar for resident student enrollment) nets one full dollar in general fund revenues. When pro-rating these fractions to the total actual tuition (and state appropriation) and research dollar volumes (\$45.8M and \$30M respectively for FY03), the contributions to the general fund are \$45.8M for tuition and 0.29 of \$30M or \$8.7M for research. Based on these relative amounts, a mingled and expendable general fund dollar comprises 84c from tuition and state appropriation sources, and 16c from contract research sources.

But importantly, and before turning to the expenditure of the general fund dollar, let me not overlook the very significant benefits to the School from the expenditure of the contract research dollar that are not accessible through general fund appropriations. These include benefits like research equipment and other contract-supported material costs of doing research (estimated at about 17c in the research dollar), payment of research assistant stipends (11c), faculty summer salaries, research faculty salaries, and fringe (totaling 25c) and research sub-contracting work (21c). We know that this all adds up to a rich research-driven intellectual environment for all, which is priceless and fundamentally why we are a research university.

On the expenditure side of the general fund dollar, which is arguably more important than the revenue side since it invokes the bottom-line, we currently return about 3c of every dollar to the Graduate School for disbursement in institutionally-supported graduate fellowships (that is, teaching assistant support) and we return about 7c in undergraduate student support for financial aid awards. This is against a current ratio of undergraduate to graduate FTE enrollments of a bit more than 5:1. The return of those 10c leaves 90c for the day-to-day running of the university, which covers all regular faculty and staff salaries and benefits, all university operating, services, and support costs, all academic and administrative plant maintenance, utilities, and debt service on the research building. This is the list that also needs to accommodate the capacity growth issues that begin this memorandum, but can't at the present time - not because 90c in the dollar is not enough (and arguably could be less), but rather because there are not enough total dollars to work with.

To get these incremental dollars, and to have the choice to expend them in the ways needed, it seems that tuition is the better source to emphasize first, since the tuition dollar offers a more than five-fold advantage over the research dollar. Being limited in our ability to raise tuition, the strategic alternative on this front is volume, or more students and as a consequence of capacity, more research. On that score, the self-funding and construction of the General Research Building is evidence of the School's investment-mindedness and recognition that research is an important avenue within the

future revenue stream. On the other hand, planned growth in student volume is relatively new territory for us. The preliminary discussions with Eva Klein Associates that preceded Ms. Klein's presentation postulated the major ten-year growth features of an undergraduate FTE to 4,800, and a larger (perhaps 900 FTE) intrusion into the professional education market within that time period. This was not intended to marginalize existing research or attenuate future research. Notably, the quoted 250 FTE's of PhD activity (which is a 40 percent growth over the current 180 FTE's) was simply charted as a flat response in future years because the consequential natural growth was not designed into that model. In hindsight, that was an unfortunate error in communicating these strategic ideas.

The School's administration has listened to your concerns over research, and is currently analyzing a refinement to the growth model to address these concerns and simultaneously provide some updated and more accurate revenue and expenditure forecasts. Within this mix, we plan to wean reliance on the research indirect earnings from the general fund, and instead be able to strategically apply a roughly equivalent amount to research development, whether that is staffing, equipment, federal lobbying, matching funds etc. We expect to have these financial revisions available within the next few days.

To the extent that growth in tuition through student volume is seen as an immediate path to needed revenues, the tactical rub lies in making this possible by organizing the rest of the institution to stimulate and accommodate the growth, and simultaneously steer the consequences into the sustainable intellectual and fiscal environment that we seek. Researchers must have time that is appropriate for research and appropriate for instruction. But with an expanded enrollment profile of the institution, together with the range of programmatic and curricula offerings that spawn from our mission, we will face large instructional obligations. We will have to appropriate new monies to academic faculty expansion, but necessarily in a designed mode to give us adequate instructional horsepower relative to new research horsepower, thus tuning the overall faculty profile to the modified enrollment profile. Not surprisingly, and like this discussion on research, a shift in the composition of our faculty membership is a controversial issue for our School, and one that is flavored by the vulnerability of quality. And we all agree that we must never lose that asset, since once lost, it is gone for good.

We have a lot of work to do. A strategic plan sets some sensible macroscopic strategic directions for the future, and I believe that we are at a point of inflection that demands some changes at the Colorado School of Mines if we are to sustain and succeed in fulfilling our potential, rather than the opposite. We need powerful thinking and discussion on these directions, as has been provoked on this matter of research, and the first order of business is getting campus convergence on the major vectors of the plan. I ask you to think seriously about this, and to do so from the purview of the whole institution, its programs, its faculty, its research activity, its support and its facilities. Simultaneously, President Trefny will be re-constituting the Strategic Planning Task Force, and I am working on recommendations that are inclusive of consensual groups,

while attempting to keep the size of the task force within a manageable number. This task force will be the springboard and central forum for other necessary studies in recruiting, enrollment management, space capacity and scheduling, academic and curricular plans that blend with the strategic directions, professional and executive programs, hiring plans for support and faculty, and similar tactical issues.

Implementation of a strategic growth plan will have to be carefully orchestrated over, say, a ten-year timeline, with planned synchronization of incremental new revenues with strategic new incremental expenditures, while honestly recognizing that there will likely be the need for some front-end risk expenditure to get the process started.

I hope that you have found this lengthy memorandum useful in guiding your thoughts on the future of the Colorado School of Mines, its sustainability, and its propensity for research in an adequately supported fiscal environment.

And as a footnote to those who wish to get some broader viewpoints on this issue, at the national level, I refer you to Ronald G. Ehrenberg's article in the August 15, 2003 issue of the Chronicle for Higher Education, entitled *Who Pays for the Growing Cost of Science?* This summarizes a national study on this topic that has been conducted at Cornell University, and it laces together the interacting elements of research, costs, and undergraduate education in the modern research university. If you are an on-line Chronicle subscriber, this article is accessible at:

[www.chronicle.com/prm/weekly/v49/i49/49b02401.htm](http://www.chronicle.com/prm/weekly/v49/i49/49b02401.htm)

Alternatively, you can go direct to the Cornell Higher Education Research Institute at [www.ilr.cornell.edu/cheri/](http://www.ilr.cornell.edu/cheri/) from which you can get the source material (and related material) for the Chronicle summary. Look for Working Paper #35.